

Ulysses Composition, Plasma and Magnetic Field Observations of High Speed Solar wind Streams, M.E. Burton, M. Neugebauer, and E.J. Smith, Jet Propulsion Laboratory, Pasadena CA, 91109 and R. von Steiger, University of Bern, Switzerland.

Abstract - During 1992-3 as the Ulysses spacecraft passed in and out of the southern high speed solar wind stream, the Solar Wind Ion Spectrometer, SWICS made continuous composition and temperature measurements of all major solar wind ions. A close anti-correlation between both the  $O^{7+}/O^{6+}$  freezing-in temperature and the Mg/O ratio with the solar wind velocity was found [Geiss et al., 1995]. The transition between low and high speed streams was found to be very steep for both parameters at both the leading and trailing edge of the stream. These observations suggest that the chromosphere and corona have a common, relatively sharp boundary separating the low- from the high-FIP (first ionization potential) region in the chromosphere and the low- from the high-temperature region in the corona and further imply that chromospheric processes must be included in discussions of the origin of the solar wind. Siscoe et al. [1995] found the specific entropy of the ions, which is proportional to  $\ln(T_i/n\gamma^{-1})$ , and which should be a constant of the flow, to be enhanced in high-speed stream and further an abrupt increase to be a good indicator of the stream interface. Goldstein et al., [1996] found  $T/n^{1/2}$  to be better predicted by solar wind speed than temperature alone. In this study, a comparison of the specific entropy with both the  $O^{7+}/O^{6+}$  freezing-in temperature and the ratio Mg/O has been made. A close anti correlation is found including a discontinuous change in entropy exactly coincidence with both the leading and the trailing edge of the high-speed stream identified in the SWICS data. These observations suggest a new useful combination of solar wind parameters which can serve as an identifier of high speed solar wind flow in the absence of data of the type the SWICS instrument provides.